(4.49) per cent. Except changing from a wet to a comparatively dry system of cleaning the decks, there does not appear to have been any circumstances to which this striking difference in the sanitary condition—of more than three (3.18) per cent.—could be fairly ascribed.

We have somewhat extended our notice of Dr. Armstrong's thin volume (the subjects of which are of practical interest to comparatively few members of the profession), because we desire to indicate to the military readers of this journal the nature and scope of the author's statements, which are not likely to be reprinted in this country. Naval hygiene and scurvy are not separately treated; but observations on both are incidentally mingled and repeated to such an extent as to expose the author to being suspected, in some degree, of want of method. Nevertheless, we commend the work to that class of readers for whom it was especially written. W. S. W. R.

ART. XVII.—*The Ganglionic Nervous System; its Structure, Functions, and Diseases.* By JAMES GEORGE DAVEY, M. D., M. R. C. S. Lond., &c. &c. London: John Churchill, 1858. 8vo. pp. 309.

THE physiological views expounded in this work have been, to some extent, already made known to the profession; especially in communications by Dr. Davey in the *London Lancet*, in 1850 and 1853. Their tendency is to exalt very much the importance of the sympathetic or ganglionic (named by Mr. Solly the *cyclo-ganglionic*) system, above what has been conceded to it by most modern physiologists; and to distance even, in this respect, the conception of the "organic life" of Bichat.

The anatomical chapter is simply preliminary and general. It emphasizes, however, the textural difference between the cerebro-spinal and the ganglionic structures, remarking that the admixture of the gray (gelatinous) and white (tubular or fibrous) substances in the latter gives to its parts or ganglia a certain independence of power and action, which the distinctness of the two in the cerebro-spinal renders impossible.

In comparative anatomy, Dr. Davey's opinions are expressed as follows:—

> "*a.* The ganglionic nervous system first exists in a molecular form, and is made up of globules dispersed throughout the homogeneous texture of the animal, as in the acrita, the lower entozoa, &c.; as such it has also been presumed to exist in the early human embryo.
>
> "*b.* These nervous globules, arranging themselves in a longitudinal series, form filaments, and these 'filaments' at length form a central point, a ganglion (*solar ganglion*, Anderson).
>
> "*c.* Ascending the scale of animal creation, and arriving at the *mollusca*, nervous matter is found secreted about and around the œsophagus, and on the dorsal aspect of the animal (supra-œsophageal ganglion); this nervous matter becomes, in the higher animals and in man, the tubercula quadrigemina or medulla oblongata.
>
> "*d.* Still ascending, the cyclo-ganglionic nervous system becomes more complicated, whilst the several tissues and structures subordinate to the same, including the cerebro-spinal system, are proportionately amplified; the increased development of the former, and the general augmentation and addition of parts in the latter, being in the relation to each other of *cause and effect.*" (P. 65.)

Dr. Davey considers that the absence of "distinctness" in the nervous tissue in the lowest forms of animal life does not disprove its existence, which he believes, on the evidence of *vitality* and *irritability*, to exist in a "molecular" or diffused state even in *plants*. Although not without some ambiguity in the reasoning, he suggests the identity of *all* primal organic cells with "nervous globules," in which alone, according to his view, vitality can reside. In the physiological chapter (p. 116) the ganglia of the sympathetic are designated as "the germ of all animal life, whether cerebral, spinal, or organic." If this expression be understood in the sense of *basis* or substratum, it will certainly be less unphilosophical than that used in the last of the propositions above quoted, in which the relationship between the circle of ganglia and the rest of the nervous system is described as that of *causation*.

Later in the volume, while criticizing the views of Dr. M. Hall, the following conclusions are enunciated (p. 188):—

> "1. That the more complicated anatomy of the spinal cord, suggested by Dr. M. Hall, and sought for by Mr. Grainger, has not yet been realized.
>
> "2. That the mere sensory and motor nerves or roots are themselves sufficient to the integrity of all those phenomena called excito-motory, which emanate from the spinal cord; or, in other words, that there is no necessity for any distinct division of the nervous (spinal) system for the production of the excito-motory phenomena.
>
> "3. That the exercise of the functions of the spinal cord is due to the peculiar influence of the ganglionic nervous system exerted on its organism.
>
> "4. That both the external and internal excito-motory phenomena are alike dependent on the vital stimulus imparted by the great sympathetic nerve; and, in the former instance, through the instrumentality or medium of the medulla spinalis, &c. &c."

The evidence and illustration of these propositions, which it would require many pages to analyze, concern especially the following subjects: the observed effects of a blow, or of pressure, upon the solar ganglion, or upon other main ganglia of the sympathetic; the history of acephalous and amyencephalous monstrosities, maintained in vitality by the ganglionic system alone; examples of cerebro-spinal paralysis, in which all organic acts, the repair of injuries, &c., have proceeded as usual; the pathology of "general paralysis of the insane," which extends to the ganglionic centres, destroying excito-motor power; experiments by Brodie, Sharpey, and Schrœden, on the effects of the removal of the brain and spinal cord; those of Reid and Magendie, proving digestion to be possible without the influence of the pneumogastric nerve; the phenomena of sleep, of animal heat, and of instinct.

We find occasional matter for criticism in the manner in which these topics are handled and made subservient to our author's purpose; as, for example, in the too easy assumption that the *spinal* system necessarily partakes of inaction, with the cerebrum, during sleep; and in the assertion, that "animal heat is no doubt essentially a vital process, and not a chemical one." If it be not *both*, we must consider it at least premature at present to *exclude* chemical action from the explanation of its production.

Our idea of the soundness of Dr. Davey's physio-philosophy is somewhat affected by his repeated expression of confidence in the doctrines of "phrenology," and of admiration for what we had learned to consider the already exploded crudities, however ingenious, of the author of the *Vestiges of Creation* upon the subject of the origin of life. The experiments of Crosse and Weekes are, by our author, still held to be "conclusive" that life does not proceed only from life.

It is probable that he may, ere long, claim the dignity of being alone in that opinion.

Although full proof does not appear to us to have been given, in the book under notice, of the *totality* of the doctrines advanced, as to the supremacy of the ganglionic portion of the nervous system, yet there is much in its statements and reasonings deserving of profound consideration, as bearing not only upon the explanation of important physiological problems, but also upon the theory of disease and the rationale of its treatment.

Dr. Davey asserts, incidentally, that too much credit has been assumed by, and conceded to, Dr. Marshall Hall, for originality as well as for exact correctness in his views of the functions of the spinal system. The *completion* (if it be yet completed) only of the physiology of the excito-motor system belongs to him; the essential ideas of it were, undoubtedly, developed by Unzer, Walker, Bell, and others, before him; as have been those of most consequence concerning the sympathetic system, by Prochaska, Clark, Grainger, Brachet, Fletcher, and others, before Dr. Davey; and, almost contemporaneously, also, their completion has been promoted by Dr. Campbell and by M. Bernard. The gradual progress of science rarely admits of the monopoly, even of one great discovery, by a single individual; nor need the genuine lover of science desire that it should be otherwise.

The chapter on the pathology of the ganglionic system is a very interesting one. The general distribution of this portion of the nervous apparatus is referred to, as proving its participation, directly or indirectly, "in every variety of abnormal action which we may witness." But especially is the pathology of fever, and that of cholera, illuminated by the consideration of the relations of the sympathetic system to the functions affected in those disorders. Upon this subject, Dr. Davey wrote as early as 1835; although Favell, Müller, and others, have also propounded similar views in regard to the nature both of fever and of cholera. From experiments upon animals, as well as from observations upon men, Dr. Davey asserts that the fatal depression of cholera, consisting in the complete annihilation of the action of all the vital organs, may be at any time simulated by pressing the solar ganglion upon the forepart of the bodies of the vertebræ over which it lies. The occasional termination in death of apparently slight attacks of ordinary disease may be accounted for, also, by a predisposition to depression and exhaustion, seated in the ganglionic centres. Diseases involving the brain, moreover, as the *apoplexia levis* of Forestus and Portal, and epilepsy, especially the *epilepsia syncopalis* of M. Hall, may be *primarily* seated in the ganglionic system, affecting secondarily, only, the cerebro-spinal apparatus. Nor is this less probably true of some more slowly progressing organic and functional diseases, as the *degeneration* of various organs, fatty or otherwise; local or partial paralysis or atrophy; hypochondriasis and irritative dyspepsia; diabetes, &c. The latter disorder Dr. Davey considers to be an affection of the *renal ganglia* chiefly. Even the pathology of dysentery is believed by him to be capable of improved interpretation under the same views; the seat of the primal disorder being inferred to be the organic (intestinal) nerves, through whose perverted influence on secretion arises the irritating character of the fluids discharged into the bowels. A very similar opinion, extending also to the explanation of diarrhœa and cholera morbus, &c., is quoted from Dr. Copland's *Medical Dictionary;* in which the recognition of the "excito-secretory" principle in the generation of disease is approached very closely.

Various spasmodic and nervous affections of hitherto indeterminate pathology our author would locate, not without plausible reasons, in the centres of organic life; as *neuralgia*, *angina pectoris*, *asthma*, *pertussis*, and *laryngismus stridulus.*

Not following him, at present, in the consideration of these, we must say of the last chapter, upon the principles of *treatment* of disease, that it does not appear to us equal in value to those which have preceded it. From the opinion that the pathology of fever and cholera consists essentially in derangement of the ganglionic nervous system, and, hence, that the primary object in their treatment should be the restoration of that system to its normal state, he passes at once to the advice, that *purgatives* should be made the basis of that treatment. Why so? No explanation is given of the *rationale* of the influence of purgatives upon the "condition of the ganglionic nervous apparatus;" and, without such an explanation, their use bears no nearer relation to the neuropathic than to any other theory of therapeutics. Nor does experience bear out, conclusively, the superiority of this plan of medication. In cholera, the failure of Dr. George Johnson to establish the potency of the "castor oil" treatment is ascribed, by Dr. Davey, to his employing *only* the oleaginous purgative, instead of using this merely as an adjuvant, to *turpentine*, *croton oil*, and *colocynth*, and aiding these also by stimulation with ammonia and brandy, &c. This last was the plan employed by Dr. Davey himself, "with confidence," during a five years' practice at Ceylon.

Notwithstanding, however, the disagreement of these therapeutical views with those adopted by the majority of practitioners, and the absence of explanation of their real connection with the author's own pathological opinions, the facts and reasonings which constitute the body of Dr. Davey's book render it well worthy of study by the physiologist and physician. Its most valuable matter is suggestive rather than demonstrative. It will require yet a long period to complete the exploration of the difficult region of the nervous system, and of its relations to disease; and still longer must we wait for the application of the matured results of such investigations to rational practice.

H. H.